Environmental Community Perspective – Established Oil & Gas Practices and Technologies on Alaska's North Slope

Written Statement of Peter Van Tuyn
Trustees for Alaska

My name is Peter Van Tuyn, and I am the litigation director of Trustees for Alaska, a nonprofit, public interest law firm whose mission is to provide counsel to sustain and protect Alaska's natural environment. We represent local and national environmental groups, Alaska Native villages and nonprofit organizations, community groups, hunters, fishers and others where the outcome of our advocacy could benefit Alaska's environment. Our services are free of charge, and for most of our clients, we provide legal counsel they could not otherwise afford on issues that affect their ways of life.

Trustees for Alaska was established in 1974 to provide support to environmental organizations and community groups concerned about the impacts of construction of the Trans Alaska Pipeline System on the environment of Arctic and Interior Alaska, including impacts to water quality and wildlife habitat. Our work has grown since our inception to include advocacy efforts and legal cases dealing with oil and gas development, mining, hazardous waste management, air pollution, water pollution, wetlands management, land use management and protection of marine ecosystems. A significant segment of our work has always focused on limiting the environmental impacts of industrial development in America's only Arctic region, commonly referred to as Alaska's "North Slope", and the oil transportation system that sustains this development. It is our belief, and the belief of the organizations to which we provide counsel, that a balanced approach to management of natural resources is needed in America's Arctic, one that protects the region's most sensitive areas, resources and cultures. Our work in the Arctic over the past twenty-five years has focused on achieving this balance.

The focus of my statement is two-fold: first, to outline the extent of existing development in America's Arctic, including the extent of leasing that has occurred in the region and the number of new developments in the offing, the environmental impacts that have occurred from existing development, and the extent to which this development has been allowed to proceed with little oversight or monitoring; and second, to underscore the unique character of America's only Arctic ecosystem, including, most notably, the only portion of this region that has been set aside and made off-limits to industrial development, i.e., the coastal plain of the Arctic National Wildlife Refuge.

AMERICA'S ARCTIC

Stretching from the Canadian border to the Chukchi Sea, south to the Brooks Range and north to the edge of the polar ice cap, the Arctic Ocean coast of Alaska comprises a unique ecosystem. It is America's only high Arctic ecosystem. It is comprised of a vast expanse of frozen earth over which lies a complex network of treeless tundra, coastal lagoons, wetlands, streams and rivers, which in turn provide habitat for some of the largest and most unique concentrations of wildlife on the North American continent.

Each summer, the wetlands of Alaska's North Slope host several million swans, geese, ducks and shorebirds. The rich saltwater lagoons of the Beaufort and Chukchi Seas provide essential calving, feeding and rearing areas for the some of the largest concentrations of marine mammals on the continent, including polar bears, Beluga whales and ringed seals. The watersheds of the region's major rivers are home to a unique population of Arctic Peregrine Falcons, as well as other raptors, including gyrfalcons, golden eagles and rough-legged hawks. The region encompasses the calving grounds of more than half a million caribou, including two of the continent's largest caribou herds—the Porcupine Caribou Herd and the Western Arctic Caribou Herd.

Progressing from the Chukchi Sea coast east to the Canadian border, the coastal plain of America's Arctic narrows as it reaches the Canadian border. The eastern portion of the coastal plain is encompassed within the boundaries of the Arctic National Wildlife Refuge. The 1.9 million acres that comprises this narrow extension of the Arctic Ocean coastal ecosystem is unique in that contains the full spectrum of Arctic habitats from the Brooks Range to the Arctic Ocean protected in an unbroken continuum. It provides essential habitat for the largest concentration of denning polar bears in America, and provides essential calving and rearing habitat for the Porcupine Caribou herd, which in turn sustains one of the nation's last remaining intact aboriginal cultures. It is truly a unique and irreplaceable part of America's Arctic. This is why it was first set aside for permanent protection by President Dwight D. Eisenhower in 1960. It is the only portion of America's Arctic that is closed to industrial development.

THE "FOOTPRINT" OF OIL DEVELOPMENT IN AMERICA'S ARCTIC

America's Arctic also encompasses some of the world's largest oil and gas reserves. Since the discovery of oil at Prudhoe Bay in 1968, oil field development in the American Arctic has entailed the construction of a massive industrial complex that now accounts for nearly 20% of the nation's domestic oil production.

Much has been said about the relatively small "footprint" of oil field development in America's Arctic. The term, "footprint", has been used to describe the acreage of Arctic coastal tundra that has actually been buried with an insulating layer of gravel in order to support oil field infrastructure, a total of over 9,000 acres[i]. It has been implied that this figure represents the extent of the impacts of development to the Arctic coastal ecosystem. But making such an implication is analogous to measuring the impact of a high seas drift net by measuring the amount of space it occupies as it lies curled up on the deck of a fishing boat. Since the discovery of oil at Prudhoe Bay in 1968, oil field development in America's Arctic has entailed the construction of a vast network of seismic exploration trails, gravel mines, roads, drill pads, pipelines, processing facilities, operating and housing facilities, and waste and sewage treatment facilities that stretches like an industrial drift net across nearly 1,000 square miles of coastal tundra from the Colville River to the Canning River, and has changed forever the character of this Arctic ecosystem. Superimposed on the East Coast, this development would stretch from Washington, D.C. down Interstate 95 to Richmond, Virginia, and east to the shores of Chesapeake Bay, with two solid-fill gravel causeways below the Potomac River stretching out into the Bay and nearly reaching the Eastern Shore. It is one of the largest industrial complexes in the world.

OIL RESERVES AND OIL LEASING ACTIVITY

From the Canning River on the western boundary of the Arctic Refuge to the Colville River delta, the State of Alaska owns almost all of the oil-rich lands onshore. The only exception to state ownership are some subsurface lands in the Colville River delta owned jointly by the state and the Arctic Slope Regional Corporation (ASRC, a for-profit regional corporation created by the 1971 Alaska Native Claims Settlement Act). There are also a small number of Alaska Native Allotment Act "homesteads" in the Colville River delta, as there are in the Arctic Refuge. The federally owned National Petroleum Reserve-Alaska (NPR-A) extends from the Colville River delta west to the Chukchi Sea. Some state land inholdings are encompassed within the boundaries of the NPR-A, as are some Native allotments, as well as inholdings belonging to ASRC and Native village corporations.

The submerged lands in the offshore areas of the Arctic Ocean are owned by the state out to three miles from shore (except off the Arctic Refuge), and beyond three miles by the federal government.

Both the federal and state governments have had oil and gas leasing programs in America's Arctic for decades. Since 1959, the State of Alaska has conducted approximately thirty lease sales in the region, resulting in the sale of oil leases that encompass some 32 million acres of state lands.[ii] Both onshore and offshore areas have been leased, such that virtually all lands between the Colville and Canning Rivers have been offered for sale at least once. In addition, the U.S. Department of the Interior (Interior) conducted a series of lease sales in the NPR-A beginning in the early 1980s, with the last sale held in May 1999.[iii] ASRC has also entered into oil and gas leasing arrangements for its wholly owned subsurface estate.

There have been six federal offshore lease sales and one joint state-federal lease sale in the Chukchi and Beaufort Seas. As a result of the federal outer continental shelf (OCS) leasing program, 660 leases encompassing 2.32 million acres have been sold,[iv] and over thirty exploratory wells drilled in Arctic federal waters between 1980 and 1997[v]. Five offshore prospects have been unitized[vi] for development (Northstar, Sandpiper, Hammerhead, Kuvlum, and Liberty.)

In June 1998, the State of Alaska offered for sale all state-owned lands not already under lease between the Colville and Canning Rivers. Despite low crude oil prices, 139 tracts spread from the Badami field in the east to the Colville River in the west were sold for more than $55 million.[vii] In addition, the May 1999 lease sale conducted by Interior in the northeast corner of the NPR-A resulted in the sale of some 130 leases for a total of $105 million.[viii]

Of these leased properties, most that lie between the Colville and Canning Rivers are either in production, are in the near-term planning/development stage, or are considered development prospects. Since 1977, 11.6 billion barrels of oil have been pumped from the producing fields.[ix] Since 1993, three new fields (Niakuk, Point McIntyre and North Prudhoe Bay/West Beach) began production, and North Star, Liberty, Badami, Alpine and Tarn are either under review for development or in progress. In addition, oil companies operating in America's Arctic have announced the discovery of onshore reserves in the Colville River Delta area that have not yet been developed. And in mid June 1998, oil companies announced two more discoveries, one in the Prudhoe Bay

area and one in the Endicott area, that could total as much as 100 million barrels.[x] More than 32 oil and gas fields have already been discovered from past exploration activities.[xi] All told, there may be more than 50 satellite fields ranging in size up to 100 million barrels each found at the fringes of the producing fields.[xii]

A common theme that runs through arguments in favor of opening frontier areas like the Arctic National Wildlife Refuge to oil and gas development is the compelling need to search for new oil (usually couched in terms of providing for the nation's "energy security".) However, existing fields and new prospects within the Prudhoe Bay area hold the promise of many years of production. Industry projections indicate that production between 2000 and 2005 will equal or exceed the current rates.[xiii] An independent research report commissioned by the Alaska Legislature predicted an increase in North Slope oil and gas field "productive capacity" by the year 2005, without additional discoveries or production from the Arctic Refuge.[xiv] And the state estimates that the North Slope oil fields will produce 7 billion more barrels of oil by 2020.[xv]

OIL FIELD DEVELOPMENT IN AMERICA'S ARCTIC

The development of the existing oil fields in America's Arctic has involved the drilling of well over 2,500 exploration and production wells, construction of 400 miles of roads, placement of nearly 1,200 miles of trunk and feeder pipelines, and construction of six oil and gas processing facilities, as well as worker housing facilities and sewage treatment and power generation facilities. And it has entailed the excavation of thirteen gravel mines that collectively occupy a surface area of over 1,400 acres, from which 60 million cubic yards of gravel have been extracted to provide a layer of insulation under all production wells, permanent roads, and processing and support facilities.

All production wells are drilled from gravel pads, many wells to a pad. Huge amounts of water are injected into an oil-bearing formation to produce more oil. Feeder pipelines connect the wells to large central processing facilities, known as flow stations or gathering centers. At the central facilities, the mixture of oil, gas and produced water is separated, and recovered natural gas is used in the fields for fuel, or is re-injected into the oil formation to maintain reservoir pressure and thereby increase oil production. A road system services the fields, and a main road (the Spine Road) crosses from east to west, joined by access roads connected to the well pads. Other major roads connect to West Dock, a causeway on the north edge of Prudhoe Bay used for receiving equipment and materials from summer barge traffic. Utility lines head east and west from the Deadhorse area, transporting electricity to the fields from central power facilities.

Two companies manage oil field production in America's Arctic, British Petroleum Amoco (BP) on the west side and Atlantic Richfield Co. Alaska (ARCO) on the east side of Prudhoe Bay. Each company has a central operations center with living quarters, office space and workshops. ARCO operates the Kuparuk field, and is generally expanding to the west (e.g., to the Alpine oil field on the Colville River), while BP has continued expanding east from its Endicott field. Both companies depend on dozens of oilfield service contractors based in Deadhorse to supply drill rigs, pipeline cleaning, oil well "work-overs," oil spill clean up, seismic surveys, and other construction and operational needs. All oil produced from the fields is sent to Pump Station 1 of the Trans Alaska Pipeline System (TAPS) and then transported down the 800 mile-long pipeline to

its terminus in Valdez. There the oil is loaded into crude oil tankers and shipped to refineries in the U.S., Japan, Korea and China.

The scope of oil field development in America's Arctic extends from the activities undertaken at the onset of exploration work to full oil field development and the transportation of crude oil to market through TAPS and the tankers loaded at the Valdez Marine Terminal. The portion of this development that has impacted the Arctic ecosystem begins with initial exploration work.

Seismic Exploration Activities

To decide where to drill exploratory wells for oil, the oil industry employs seismic exploration techniques. Seismic exploration uses either huge vibroseis trucks weighing 56,000 pounds, with heavy steel vibrators mounted on them,[xvi] or explosives, to produce sounds at or near the surface. This is done at thousands of "shot" points along lines that are surveyed across the tundra or offshore. Small microphones, known as geophones, attached to miles of cables are placed on the ground along the lines near the "shot" points. When the vibroseis machine or dynamite is detonated, the sounds produced, including echoes from underground rock layers, are recorded on tape. Computers process this data to produce maps of the subsurface layers.

There are many potential adverse effects from seismic exploration. Past studies of seismic exploration in the Arctic Refuge showed significant effects on tundra vegetation and permafrost.[xvii] In June 1998, after receiving objections from the Alaska Eskimo Whaling Commission representing Inupiat subsistence whale hunters, Alaska's North Slope Borough denied an application from Western Geophysical for offshore seismic exploration operations in the Beaufort Sea in several shallow coastal areas between Harrison and Camden Bays, citing new scientific information that "... showed the effects of one open water seismic survey displaced bowhead whales 12 miles from their migration path..."[xviii]

The latest development in seismic exploration technology is known as "3-D seismic" testing. 3-D seismic testing is more effective in determining geologic structures, but it can have more impact. The 3-D seismic crews are larger, and there are more tracked vehicles out on the tundra. The grid pattern is tighter. The 3-D seismic lines where vehicles travel laying out the grids of recording equipment are generally only about 1,000 feet apart. By contrast, conventional seismic lines are spaced six to ten miles apart.

The 3-D seismic crews on the North Slope in the winter of 1998 had 39 vehicles, including six bulldozers; ten vibroseis trucks weighing as much as 68,000 pounds each,[xix] fuel supply vehicles, and a variety of other vehicles all manned with a crew of 100-200 people. Typically, two crews operate at the same time in one season, so there may be as many as eighty vehicles involved.

There is strong evidence that 3-D seismic exploration activities may cause lasting damage to the Arctic tundra ecosystem. One federal biologist documenting the aftermath of 3-D seismic work reported that, "… new trails and older ones in various stages of recovery are visible from the air and on the ground in the summer. Current seismic exploration produces a much denser gird of trails than that in the Arctic Refuge. While the trails in the Arctic Refuge were five to twenty kilometers apart, those being made now are from 200 to 500 meters apart. Despite the magnitude of this activity, no

studies have been published on the effects of seismic exploration on vegetation and soils in the Prudhoe Bay area and the cumulative impacts of many years of exploration and re-exploration have not been addressed."[xx]

Drill Sites in America's Arctic

The sheer number of wells drilled in North Slope oil fields gives a sense of the scale of development in the region. Some 2,586 exploration or production wells were drilled on the North Slope between 1944 and July 1992.[xxi] According to the U.S. Army Corps of Engineers (the Corps of Engineers, or the Corps), there are now approximately 1,830 oil production wells, 97 gas injection wells, and 618 water injection wells in operation in North Slope oil fields.[xxii]

Numbers for offshore development activities and facilities in the Beaufort and Chukchi Seas are equally massive. As of 1993, oil development in the Beaufort and Chukchi Seas included the placement of 216 exploration and delineation wells, 1,209 development and production wells, the laying of hundreds of miles of pipelines, construction of nine causeways, docks and pipeline landfalls, and the transit of thousands of barge and boat supply trips, tens of thousands of aerial over-flights and hundreds of thousands of miles of seismic lines.[xxiii] These figures do not reflect the extent of the infrastructure associated with the onshore support activities necessary to carry out offshore development of this magnitude.

Water Use in Arctic Oil Fields

In 1980, the Corps of Engineers estimated that domestic use of water in North Slope oil fields (for drinking, washing, food preparation, etc.) was 85 gallons per capita per day, or a total of 800,000 gallons per day.[xxiv] In addition to these domestic uses, both fresh water and seawater are used in oil field production. Drilling operations require large quantities of water for blending into drilling muds. A typical 10,000 foot well could require about 850,000 gallons of water for drilling, in addition to the amount needed for camp use. Over a four-month drilling season, a one-well drilling operation could require 1.6 million gallons of water.[xxv] For ARCO's Alpine development, the total water demand over one winter season of 150 days is estimated to be 8.4 to 14.7 million gallons.

At Prudhoe Bay, treated seawater is injected into oil-bearing formations to enhance oil production. The Corps reported there were 624 of seawater injection wells supporting existing onshore oil and gas facilities in June 1998.[xxvi] The operating capacity of these wells totals some 2,884 thousand barrels of water per day, a huge number but well below the design capacity of the facilities.[xxvii] The seawater treatment plant on the northern end of West Dock causeway supports secondary oil and gas recovery in the Prudhoe Bay and Milne Point reservoirs. In 1998, it was processing 390,000 barrels of water per day, with the capacity to process up to 1.2 million barrels per day.[xxviii]

Vast amounts of water are also needed for the construction of ice pads, ice roads and ice runways that are used to develop exploration wells and isolated fields such as the Alpine field. For example, to construct a six-acre ice pad one foot thick requires about 500,000 gallons of water.[xxix] The U.S. Bureau of Land Management (BLM) estimates that 1.0 to 1.5 million gallons of water is needed per mile for a six-inch thick, 30-35 foot-wide road.[xxx]

To put the use of such huge amounts of water into ecological perspective, it must be remembered that the Arctic is very arid. Average annual precipitation across the North Slope oil fields ranges from about three to seven inches.[xxxi] Water withdrawal from the roughly 75 active permitted onshore water sources has the potential, therefore, of causing significant environmental changes.[xxxii] In areas such as the coastal plain of the Arctic Refuge, where water is very scarce, the impacts could be far more severe.

Gravel and Gravel Mining in America's Arctic

Gravel is a resource second only in importance to crude oil in Arctic oil fields. All of the onshore oil fields in America's Arctic are located in wetlands underlain with permafrost. As a result, a layer of gravel five feet in depth or greater is needed as a foundation for production wells, permanent roads, causeways, offshore man-made islands, airstrips, gathering centers, pump stations and all other oil field facilities. And all oil field development must be reviewed by the Corps of Engineers pursuant to Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act before it can proceed. According to records compiled by the Corps, over 900 applications for filling wetlands for oil and gas development activities in Alaska were approved between January 1979 and April 1992.

Gravel for development of oil field facilities has been taken from some thirteen large, open-pit mines in the floodplains and deltas of major rivers in the region. Seven of these are currently active.[xxxiii] Together, the mines cover a surface area of over two square miles. The U.S. Fish and Wildlife Service (USFWS) estimates that more than 60 million cubic yards of gravel have been mined from these mines for roads and drill sites in North Slope oil fields,[xxxiv] enough to cover the entire state of Rhode Island with an inch-thick layer of gravel. Just as with water, gravel is a scarce resource on the coastal plain of the Arctic Refuge. Mining and transportation of what gravel resources do exist in the Refuge for purposes of constructing oil field facilities could result in significant impacts to the area.

Oil Field Transportation Infrastructure in America's Arctic

Gravel roads. The Alaska Department of Natural Resources (ADNR) estimated that oil development on Alaska's North Slope included over 400 miles of gravel roads, excluding the 13 miles of road that lie atop gravel causeways jutting into the Beaufort Sea and the 145 mile-long TAPS "haul road", or Dalton Highway, that stretches from Pump Station 1 south through the Brooks Range to the Yukon River.[xxxv] In 1996, a survey of traffic along the TAPS haul road showed a total annual transit of 45,236 trucks, an average of 3,770 a month.[xxxvi] Recently, the State of Alaska opened the TAPS haul road to travel by the general public (over the objection of the Alaska Native communities in the region), thereby increasing the impacts of road traffic to air quality and wildlife.

Ice roads. For frontier areas in the oil fields of the Arctic, ice roads are used for winter transportation.[xxxvii] Ice roads, ice pads and airstrips are constructed by smoothing or compacting the snow surface and spraying water on the surface to build up an ice layer.[xxxviii] Ice infrastructure is often pointed to as an improvement over infrastructure built with gravel, based on the claim that the ice will melt, leaving no trace.

In order to create the ice used for this temporary infrastructure, however, water is displaced from its natural location. This may have deleterious short and long-term effects on aquatic life and vegetation. New designs for ice pad construction have allowed pads to remain intact over a summer season, and " … limited, short-term impact does occur at multi-season ice pads, if tundra around the perimeter of the pad thaws and is blocked from sunlight."[xxxix] Long-term impacts from ice roads, pads and runways are not well studied. At a minimum, there may be a "greening" of vegetation when the ice melts, leaving square strips and miles-long rectangles strewn among the natural polygonal shapes of the tundra landscape.[xl]

Airports. While much of the huge amount of equipment and supplies needed for oil development in the Arctic comes by summer barge or on the TAPS haul road, development could not proceed without air transportation. At the time the construction of TAPS was contemplated, there were already four major gravel airports in the oil fields, at Prudhoe Bay, Deadhorse, Rivers Service City, and Sagwon (60 miles to the south), in addition to airports at Barrow and Nuiqsut.[xli] There were three jet runways and nine exploration support airstrips in the oil fields by 1987.[xlii] Today, the state-owned and operated Deadhorse airport accommodates Boeing 737 jets on its 6,500 asphalt runway, with arriving and departing passengers numbering some 140,000 per year.[xliii] In addition, BP and ARCO own and operate 6,500 foot-long airstrips at Prudhoe Bay and Kuparuk. These have annual arrival and departure passenger counts of some 220,000 personnel.[xliv]

ARCO has received permission from the Corps of Engineers to build a 3,000-foot airstrip in the Colville River floodplain to service its Alpine oil field, and there is a new airstrip at the Badami development. In addition, there is a 5,200-foot airstrip at Lonely; a 7,000-foot airstrip at Inigok south of Teshekpuk Lake; and a state-owned 5,400-foot airstrip at Umiat on the Colville River southwest of Nuiqsut.[xlv] The impacts of placement and operation of these airports is not well understood.

Docks. Marine barges bring oilfield supplies and equipment to Arctic oil fields in the ice-free summer months. To accommodate them, the oil industry uses two of three existing docks for unloading barges at Prudhoe Bay. Both are at the end of man-made, solid-fill gravel causeways, with West Dock the biggest at 13,100 feet long and 40 feet wide.[xlvi] Such causeways have had a long, controversial environmental history because they have disrupted ocean current and temperature regimes, and have caused impacts on migration patterns of fish and other sea life.

Oil Pipelines in America's Arctic

In 1993, the state estimated that oil development on Alaska's North Slope included 1,137 miles of pipelines, excluding the 798 mile-long main TAPS pipeline to Valdez.[xlvii] The State of Alaska only regulates a portion of these pipelines. In 1997, the BLM estimated that there were seven major trunk pipeline systems (above ground and elevated) carrying crude oil to TAPS, totaling approximately 141 miles in length.[xlviii] In June 1998, the Corps of Engineers reported that, " … approximately 1,123 miles (1,807 km) of pipelines connect producing wells to production processing facilities, and then to the TAPS."[xlix] None of these estimates include the hundreds of miles of additional product, gas and fuel lines strung throughout the oil fields.

Industrial Centers in the Arctic Oil Fields

The enormous industrial complex that comprises the oil fields on Alaska's North Slope includes an intricate web of oil and gas processing facilities connected by road and pipeline systems.

Power Plant. Power for most field operations in the Prudhoe Bay region is supplied by a central power plant located near Deadhorse. Power is distributed mainly via overhead power lines, although some lines are buried.

Central Processing Facilities. ARCO and BP operate a total of 6 central processing facilities.[l] According to the U.S. Environmental Protection Agency (EPA), as of 1995, there were a total of twelve gathering centers on the North Slope. All, but the Endicott gathering center, are onshore. (The Endicott field facilities are located on two man-made gravel islands in the Beaufort Sea.)

Refineries. ARCO's crude oil topping plant is one of 2 refineries located in the oil fields. This plant refines 1 million gallons of crude oil per day into diesel, jet and other fuels used on the North Slope.[li]

Residential Centers. ARCO and BP each have a base of operations that serves as a residential center and central office complex for the roughly four to five thousand oil company employees who live and work in the surrounding oil fields.[lii]

IMPACTS OF OIL FIELD DEVELOPMENT IN AMERICA'S ARCTIC

The impacts of oil field development in America's Arctic, including the impacts of the millions of gallons of surface discharges and thousands of tons of air emissions released each year from North Slope oil fields, are not well documented. While development on the North Slope has grown exponentially since the drilling of the discovery well in 1968, no state or federal agency has undertaken an evaluation of cumulative impacts of development in the region. No full environmental impacts review conducted pursuant to the National Environmental Policy Act (NEPA) has been undertaken for any onshore development in the entire region, with the exception of the Environmental Impact Statement (EIS) completed for TAPS in 1972. Development has been allowed to proceed "piecemeal" over the last thirty years, with no analysis of the full range of impacts from expanding industry activity in the region.

The TAPS EIS published in 1972 listed the Prudhoe Bay, Lisburne and Kuparuk "pools" as oil reservoirs to be developed, but it contained only seven sketchy, speculative pages devoted to development scenarios.[liii] Most of the oil fields that exist in the region today were not predicted in the TAPS EIS. No development was predicted for areas farther west than Oliktok Point or father east than the east channel of the Sagavanirktok River.[liv] The eastern developments at Endicott, Badami, Point Thomson, and Sourdough were not predicted, and western developments like Alpine, Tarn and others were also not foreseen. Of the fields not foreseen in the TAPS EIS and for which cumulative impacts have never been fully assessed, Milne Point, Endicott, Niakuk and Point McKintyre are considered "major" fields by the state.[lv] In short, for the region in America's Arctic from which over 20% of the nation's domestic oil supply is being extracted, no comprehensive EIS assessing the scope and magnitude of the environmental impacts of this massive industrial complex has ever been undertaken. In light of this fundamental lack of information and understanding, it is disingenuous for proponents of developing the Arctic

Refuge to suggest that such development can be undertaken with little impact to the coastal environment of the Refuge.

Congress recognized this serious lack of information and understanding when it approved legislation in September of last year directing the EPA to contract with the National Research Council (NRC) to conduct a two-year review of the cumulative impacts of oil development in America's Arctic. It is anticipated that this study will not only provide some insight into the extent of the impacts, but will also provide information regarding the industry's compliance record and the effectiveness of state and federal agency oversight, as well as the effectiveness of mitigation measures taken to ameliorate development impacts. We have some concerns regarding whether the review will be fair and objective given the intense industry scrutiny it has been receiving, but we are hopeful.

The initiation of the NRC review is particularly timely. Three new oil fields are being developed in America's Arctic, which represent giant steps to the east, west, and north of Prudhoe Bay, further spreading existing oil field infrastructure. ARCO's new Alpine field, located entirely within the active flood plain of the Colville River delta, will require a thirty five-mile long pipeline to reach existing processing facilities. BP's new Badami field is located 25 miles east of Endicott, which marks the eastern boundary of current development, and, like the Alpine field, has necessitated the construction of a pipeline to connect it to the existing Prudhoe Bay area infrastructure. And to the north, BP's Northstar development will be located on a man-made gravel island in the Beaufort Sea about six miles offshore of the Kuparuk River delta in Gwydyr Bay. It will be connected to shore-based processing facilities by a seven mile-long subsea pipeline that will transect an active ice scour area on the Beaufort Sea coast. The use of a subsea pipeline represents untested technology in this harsh Arctic environment. How development and operation of these new fields will exacerbate the impacts of existing oil field development is not known. Nevertheless, development of these fields is moving forward.

Despite the lack of a comprehensive review of the cumulative impacts of oil development in America's Arctic, information is available that provides some insight into the magnitude of the pollution and waste streams generated daily from oil field operations.

Solid Waste. The only major solid waste facility in the oil fields is the Service Area 10 landfill at Deadhorse operated by Alaska's North Slope Borough. Metals, excess cement, sand, rubber, timbers, insulation, ash, non-hazardous chemicals, plastic, paper, household wastes, and other industrial garbage is disposed of at this landfill.

The principal contributors of solid waste to the Area 10 landfill are the BP and ARCO oil processing facilities, the TAPS pump stations, some 30 miscellaneous service contractors, and various industry camps.[lvi] About 23,000 tons of wastes were handled in 1994-95.[lvii] In 1996, nearly 53,000 cubic yards of waste were handled, and 38,000 cubic yards were handled in 1997.[lviii] BP says that between 1990 and 1997, its oil and gas development operations generated an average of 45,000 cubic yards per year of solid waste; and in 1997, it generated over 10 tons of hazardous waste.[lix]

Air Pollutant Emissions. Air pollution in the existing oil fields is generated in part from large stationary sources, which are permitted under state and federal air quality regulations. The oil fields contain one of the largest groupings of gas turbines in the world.[lx] Ninety-eight natural gas-fired turbines were operating as of 1988.[lxi]

The Corps of Engineers measured actual emissions from stationary sources at the main facilities for BP and ARCO's operations. According to the Corps' report, between June 1, 1994 and June 30, 1995, actual emissions of nitrous oxides (NO_x) equaled 56,427 tons. Emissions of carbon monoxide (CO) equaled 11,560 tons; sulfur dioxide (SO_2) equaled 1,470 tons; particulate matter (PM_{10}) was 6,199 tons; and volatile organic compounds (VOCs) was 2,647 tons.[lxii] To put these numbers in some perspective, the amount of NO_x emitted from the Prudhoe Bay oil fields dwarfs the total emitted in Washington, D.C, and is twenty thousand more tons per year than all other Alaskan sources combined. According to EPA data, the entire State of Washington has about 8,200 tons of NO_x emissions per year.[lxiii] Oil field CO emissions are one third of the total of all CO emissions for Anchorage, Alaska's largest city with a population of 300,000.[lxiv]

In addition to the emissions from major facilities, there are hundreds of other so-called "minor" sources of air pollution in the oil fields for which air quality control permits are not required and for which no monitoring of emissions is done. These include mobile oil drilling rigs, automobiles, buses, trucks, aircraft, heavy equipment like bulldozers and seismic vehicles, small incinerators, unregulated fuel tanks, and fugitive dust sources like gravel pits and road dust. Added into the mix of emissions are toxic pollutants, such as arsenic, nickel, benzene and mercury. Because the oil and gas industry is exempt from the toxic release inventory reporting requirements of the federal Emergency Planning and Community right to Know Act of 1986, information regarding these air pollutants is difficult to find.[lxv] But there are some troubling signs that these toxins are being produced as a part of ongoing oilfield operations. For example, elevated levels of nickel, mercury and other metals have been found in the snow pack in the Prudhoe Bay area.[lxvi]

Wastewater discharges. Wastewater discharges from oil field operations at Prudhoe Bay are governed by state and federal pollution control and discharge permits. There are over 400 pollution permits that govern industry operations in the Prudhoe oil fields. Permitted waste streams include discharges from sewage treatment plants, discharges from the water flood treatment plant, drilling muds and cuttings, and gravel pit de-watering discharges. During the period from 1991 through 1997, approximately 25 billion gallons of contaminants were discharged into surface waters under National Pollution Discharge Elimination System (NPDES) permits issued by EPA. There are also over 200 wastewater permits issued by the Alaska Department of Environmental Conservation (ADEC) for facilities related to oil and gas production in the Prudhoe Bay region. These permits represent millions of gallons of additional discharges into surface waters of the region.

In addition to the discharge of huge amounts of wastewater released by treatment facilities in existing oil fields, the arctic ecosystem has been changed by construction of facilities that alter normal water flow in the region and adversely affect water quality. For example, the placement of gravel roads and drill pads in some areas has disrupted the surface flow of water and created large, deep-water ponds that lack the biological productivity of natural, shallow water tundra ponds. In some cases, natural lakes have been drained, inadvertently or on purpose, for construction of support facilities. Pump Station 1 of TAPS is constructed entirely in the basin of a large tundra lake that was drained to clear the way for construction. And in the nearshore environment of the Beaufort Sea, according to the Corps of Engineers, " … (e)xisting causeways have been identified as a cause of significant exceedances of chronic state marine standards for water temperature, salinity, and turbidity."[lxvii]

Oil Spills. The State of Alaska only began collecting comprehensive oil spill data for existing Arctic oil fields in the mid-80's. The state's figures show spill numbers peaked at 1,314 annually in 1989.[lxviii] Between January 1, 1984 and May 24, 1993 in the oil fields, there were 1,955 crude oil spills involving 8,960 barrels (376,321 gallons), 2,390 diesel fuel spills involving 11,068 barrels (464,856 gallons), 977 gasoline spills involving 3,128 barrels (131,382 gallons), and 1,360 hydraulic fluid spills involving 1,840 barrels (77,301 gallons).[lxix] In 1990 alone, the state claimed that 4,096,348 gallons crude oil, petroleum products and toxic substances had been spilled on the North Slope, mostly from oil industry activities.[lxx] In 1996, 416 spills resulted from North Slope oil industry activities, with more than 60% of these crude oil and other hydrocarbon products.[lxxi] Other toxic materials spilled include acid, biocides, and ethylene glycol.

According to the BLM, " … the causes of Alaska North Slope crude-oil spills, in decreasing order of occurrence by frequency, are leaks, faulty valves/gauges, vent discharges, faulty connections, ruptured lines, seal failures, human error, and explosions. The cause of approximately 30 percent of the spills is unknown."[lxxii] The chronic nature of the spills and the large percentage that are of unknown origin suggest the existence of faulty spill prevention systems, sloppy practices, and inadequate government oversight and enforcement.

Almost all of the Arctic spills to date have occurred in connection with onshore developments. BP's proposed Northstar offshore development will be the first to include a subsea crude oil pipeline, running from an artificial gravel island to the shore and buried in the sea bed of the Beaufort Sea. Most of the year, the Beaufort Sea is covered in ice, and in near shore areas the ice completely displaces water to the depth of many feet. A large crude oil spill from an offshore well blowout or pipeline break would be an unmitigated disaster even under the most optimistic oil spill cleanup planning scenarios.

Contaminated Sites. As of 1996, there were 60 sites contaminated by oil-related industrial activity listed for the North Slope in the state's contaminated sites database. ADEC considered more than half of these high priorities for clean up. More than a third of the high priority sites have been on the list for more than 5 years. A number of sites have been identified for more than a decade, and still have not been cleaned up.

Reserve Pits. For years, EPA and USFWS expressed concern about the disposition and effects of oil field wastes. At Prudhoe Bay and other onshore fields, the companies dumped drilling muds and cuttings into open "reserve pits" that adjoined drill pads and were diked with gravel berms. About 2-6 billion gallons of drilling wastes were dumped into some 450 reserve pits on the North Slope.[lxxiii] The unlined pits filled with snow in winter. The snow melted in the spring and the mixture spilled over the dikes into tundra ponds and wetlands. Fluids also leaked through the gravel basins. A common way of getting rid of the excess water created by snow melt in the reserve pits was to pump it directly into tundra wetlands or to spray it on oil field roads to control dust.

In 1988, Trustees for Alaska and other conservation groups sued ARCO to halt discharges of reserve pit fluids into tundra wetlands, and to end other violations of the Clean Water Act. As a result of the lawsuit, the oil industry abandoned the use of surface reserve pits and began injecting production wastes underground into oil-bearing

formations. According to BLM records, there are currently 262 abandoned reserve pits in North Slope oil fields that have yet to be cleaned up and closed out.[lxxiv]

Waste Injection. The standard practice for management of production wastes in Arctic oil fields today is to inject the wastes into oil-bearing formations deep below the earth's surface. EPA and the Alaska Oil and Gas Conservation Commission (AOGCC) have jurisdiction over the underground injection of oil field wastes. These agencies have permitted two classes of injection wells. The first, Class I wells, can be used to dispose of production wastes, i.e., wastes that are generated at the well site in the drilling process, such as drilling muds and produced water, and also wastes generated from non-production activities, such as used motor oil, solvents and paints. The second, Class II wells, can only be used to dispose of production wastes generated on site[lxxv]. Hazardous substances cannot be injected into either class of well, but must be transported to an authorized hazardous waste disposal facility.

There are three Class I waste disposal injection wells on the North Slope permitted by EPA. To date, over 325 million gallons of wastes have been injected into these wells. EPA is currently processing permit applications for two additional Class I injection wells. The AOGCC permits and monitors 30 Class II injection wells on the North Slope. Over 42 billion gallons of wastes have been injected into these wells.

While it is the environmentally preferred alternative over the aboveground handling and disposal of wastes, underground injection has not been without problems—problems that suggest an inadequate level of government oversight over oil field activities. For example, a drilling company working under contract to BP pled guilty in April 1998 to illegally injecting Class I wastes and other hazardous substances into a Class II injection well at the Endicott oil field, and then falsifying records to hide these illegal disposals. Some of the wastes reached the surface and the surrounding waters of the Beaufort Sea.

The illegal dumping at Endicott was brought to light after a whistleblower reported the violations to federal authorities. Doyon Drilling, the BP contractor, was found guilty of 15 misdemeanors, ordered to pay $3 million in fines, and given five years probation for ordering workers to dump thousands of gallons of toxic waste into the unprotected well shaft, including lead, methyl chloride, toluene, xylene and benzene. Three Doyon employees pled guilty to federal charges and were ordered to pay $25,000 fines. One was given a year's prison sentence.[lxxvi]

In 1999, BP pled guilty to a criminal felony count of failing to report the discharge of these hazardous wastes, and concurrently settled a civil case brought by the United States concerning the same events. As part of the criminal case and BP's probation, BP paid $500,000 in fines and will pay $15,000,000 in an attempt to ensure similar problems do not recur. BP also agreed to pay a fine of $6,500,000 in the civil case. Consequently, BP agreed to spend $22,000,000 for one felony violation of a federal environmental law and a concurrent civil case based on the same facts.

That the illegal dumping occurred at the Endicott oil field is ironic. Endicott is often held up as a model of how oil field development should be done by proponents of opening the Arctic Refuge to oil development.

OIL INDUSTRY EXEMPTIONS FROM ENVIRONMENTAL LAWS

A significant impediment to determining the impacts of oil development in America's Arctic is that much of the needed information regarding pollution and waste management is not available. This is due in great part to the fact that the oil industry—unlike other heavy industries in this country—is not required under state or federal law to provide such information to state and federal regulators or the public. The oil industry enjoys a number of significant exemptions to environmental protection laws, a situation that speaks to the political power of the industry and its ability to influence public policy-making regarding environmental protection.

Among the exemptions the oil industry enjoys are exemptions from federal water quality, hazardous wastes and community right-to-know laws designed to reduce pollution and protect environmental and human health.

RCRA hazardous waste exemption. Congress exempted certain oil and gas extraction wastes from regulation as hazardous wastes under the Resource Conservation and Recovery Act (RCRA), pending an EPA study.[lxxvii] Trustees for Alaska sued EPA to force it to do the study. When the agency finally completed the study in late 1987 during President Bush's Administration, it determined that regulation of such wastes was not warranted.[lxxviii]

The RCRA exemption gives special treatment to the high volumes of oil production wastes, such as drilling muds and cuttings, oil rig wastes, produced water, and associated wastes, including tank bottoms, pit sludges, and well work-over wastes. If these wastes were produced by any other industry, such as dry cleaners, they would be regulated as hazardous wastes with special precautions taken.[lxxix]

Toxic Release Inventory. Anticipating that an informed public would pressure companies to reduce emissions, in 1986 Congress enacted the Emergency Planning and Community Right-To-Know Act. The Act requires certain polluters to report annually their toxic releases for inclusion in a Toxic Release Inventory, a database maintained by EPA and made available to the public. The database has been used to support calls for stronger regulations, and to publicize local polluters, as well as to prepare communities for accidental releases of toxic substances. Some financial advisors even use the database to screen companies for investors.[lxxx]

The oil industry is largely exempt from reporting oil field wastes to EPA for inclusion in the Toxic Release Inventory.[lxxxi] In 1996, the industry was successful in its lobbying efforts to ensure that most oil field exploration and production facilities were exempted from EPA regulations that addressed the kind of industries required to submit yearly "right-to-know" reports.[lxxxii] The exemption covers toxic air pollutants produced in oil field operations in America's Arctic, including lead and known carcinogens such as polycyclic aromatic hydrocarbons, benzene, and xylene.

No Net Loss Of Wetlands … Except In Alaska. During his Administration, President Bush adopted a "not net loss of wetlands" policy which called for compensation for wetlands destruction through purchase, creation, and/or preservation of other wetlands. In 1990, the Corps of Engineers and EPA entered into a memorandum of agreement concerning mitigation requirements under Section 404(b)(1) of the Clean Water Act that were designed to implement the no net loss policy. Because

virtually all oil and gas development in America's Arctic occurs in wetlands, both the oil industry and the State of Alaska vehemently opposed these mitigation requirements. In August 1991, the Bush Administration revised its wetlands protection policy to exempt Alaska—and Alaska only—from the compensation and avoidance requirements of this national wetlands protection policy.

When the Clinton Administration came into office, it reversed the course of the previous administration on Alaska wetlands protection. Since then, the Alaska Congressional delegation has unsuccessfully pursued bills to revive the idea of special treatment for Alaska wetlands. In 1997, the Alaska Legislature passed a resolution demanding that Congress and the President require the Corps of Engineers to "customize a (wetlands) permitting process ... in Alaska that does not include burdensome mitigation, avoidances, and other requirements applying nationally ... "[lxxxiii]

Low sulfur diesel fuel for mobile sources. Section 211 of the Clean Air Act[lxxxiv] forbids the sale of motor vehicle diesel fuel which contains a concentration of sulfur in excess of 0.05 percent (by weight) or which fails to meet a cetane index of 40. Section 211 was passed because Congress wanted to reduce emissions of diesel particulates, which cause cancer, genetic mutations and other human health problems. Despite the documented health risks, the State of Alaska petitioned EPA for an exemption from Section 211.[lxxxv] The state claimed that whatever particulate matter problems it has are not due to diesel fuel, and that because Alaska's refineries do not produce such fuel, the transportation costs of shipping such fuel to Alaska would be too expensive. Alaska's oil refineries lobbied aggressively for the exemption because sulfur content in refined products is directly dependent on the sulfur content of the crude oil refined. And Alaska North Slope crude is so high in sulfur content that refiners, including the operators of the refineries in the North Slope oil fields which produce diesel for the fleets of vehicles serving the fields, were not able to make a lower sulfur diesel fuel without significant additional investment.

EPA has granted Alaska's petition[lxxxvi] on two separate occasions, giving rural areas of the state, including North Slope oil fields, a permanent exemption and urban areas temporary exemptions.[lxxxvii] Alaska is the only state in the nation to be granted these exemptions. EPA is now considering Alaska's petition to make the urban exemption permanent and may either accept it outright or establish an Alaska-specific "phase in" period that could years.

Nonroad engines. Prior to 1990, the Clean Air Act divided air pollution sources into two groups, stationary sources and mobile sources. Mobile sources included common highway vehicles (cars and trucks). In 1990, Congress amended the Clean Air Act to mandate the adoption of emission standards for stationary sources, termed "nonroad engines" or NREs. NREs include any internal combustion engine that is not used in a highway vehicle. The definition includes oil and gas drilling rigs, which are equipped with generators and other fuel burning equipment.

Since the passage of the 1990 amendments, the oil industry operators in Alaska have routinely opposed any additional regulation of oil drilling rigs as NREs.[lxxxviii] They requested that ADEC exempt NREs from any permitting requirements. In response, ADEC examined the potential air quality impacts from oil drilling rigs and other NREs. After modeling potential NRE emissions and their impacts, ADEC decided that sulfur dioxide emissions posed a threat to ambient air quality. With respect to sulfur dioxide

emissions, ADEC proposed an amendment to state air quality regulations that would have established allowable fuel sulfur concentrations for NREs, or allowed the selection of other alternative mechanisms for dealing with the emission threats. A group calling itself "The Alaska Stakeholders," composed of oil companies, oil refiners, some utilities and other users of high sulfur diesel fuel, vigorously opposed the new regulation. After intense industry lobbying, the regulation was withdrawn.

In February 1998, a bill was introduced in the Alaska Legislature that exempted NREs and flares associated with oil and gas exploration and production facilities from all state air quality regulations—including permitting and analyzing the effects of air pollution from NREs. EPA said that if the bill became law it would be compelled to take over Alaska's air permitting program and Alaska risked losing its federal highway funding. In a statement that reveals much about the current climate regarding oversight of oil industry operations in Alaska, ADEC's Senate Bill 299 Summary Analysis claimed that one of the bill's defects was that it " … *could increase public scrutiny* of air pollution issues surrounding oil drilling activities leading to more burdensome regulation … " (Emphasis added). ADEC also argued that if Alaska lost control of the air program to EPA, EPA would be much stricter. The bill passed, but was vetoed by the Governor. ADEC then entered into a non-binding agreement with oil rig operators in which ADEC agreed to allow a three-year transition period to implement the control of emissions from oil industry NREs envisioned by Congress when it passed the Clean Air Act amendments nearly a decade ago.[lxxxix]

State Laws Governing Oil Industry Operations. The degree to which the oil industry has been able to influence state public policy-making regarding oil development in Alaska is astounding. As a demonstration of this influence, one need only review the legislation passed by the Alaska Legislature in recent years:

- Ch. 35 SLA 1994. Created a new oil and gas exploration licensing regime, one environmentally less restrictive than the existing licensing regime.
- Ch. 38 SLA 1994. Limited the scope of judicial review of ADNR decisions regarding whether an oil and gas lease sale was in the state's best interest.
- Ch. 11 SLA 1995. Rescinded ADEC's authority to regulate disposal of drilling muds, cuttings, non-hazardous oil and gas fluids and other wastes that are that are re-injected.
- Ch. 53 SLA 1996. Created a program for royalty credits for companies that discovered new oil and gas fields in Cook Inlet. (The law has the potential effect of increasing industry profits and reducing state royalty income.)
- Ch. 138 SLA 1996. Eliminated ADNR's duty to make a finding that an oil and gas lease sale was in the public's "best interests" if a finding was made in the previous ten years, absent the discovery of some unspecified kind of "significant" new information.[xc]
- Legislative Resolve 3 and 5 (1997). Demanded that the Arctic Refuge and NPR-A be opened to oil and gas development.
- Legislative Resolve 19 (1997). Asked Congress and the President to "require the United States Army Corps of Engineers to customize a permitting process for all lands in Alaska that does not include burdensome mitigation, avoidances (sic), and other requirements applying nationally ... " to the preservation of wetlands.
- Ch. 29 SLA 1997. Insulated industry from civil or criminal penalties for violations of environmental laws if the violations were "discovered" in corporate self-audits. The

law also allows industry to keep audit information on the release of toxic substances confidential and withhold it from the public.

- SB 299 (1998). Would have forbid ADEC from regulating air pollution from oil drilling rigs, oil and gas flares, and associated oil industry equipment. The governor vetoed the bill, saying "We will not be able to convince the federal government to explore new oil and gas areas in Alaska like the National Petroleum Reserve if we weaken environmental standards."[xci]
- "Arctic Power" appropriations (1998). Appropriated $225,000[xcii] to Arctic Power, a private organization lobbying to open the Arctic Refuge to oil development, adding to the $378,000 Arctic Power had already received in state funds. In the same budget, the Legislature reduced funding for review of wastewater permits and for protection of drinking water quality in Alaska.

ENVIRONMENTAL ENFORCEMENT IN ARCTIC OIL FIELDS

The adverse impacts from the exemptions and special protections the oil industry has secured in state and federal environmental protection laws have been exacerbated by an accompanying lack of adequate enforcement of the environmental laws that do apply to industry operations in America's Arctic. While oil field development has expanded in the region, regulatory agencies responsible for overseeing industry operations on the North Slope have suffered significant budget cuts. These oversight agencies are chronically under-funded and routinely rely on industry self-monitoring to determine if permit stipulations are being met. As a result, conservation-minded citizens have had no recourse to ensure effective enforcement of state and federal environmental protection laws in Arctic oil fields, except courts of law. It is a great irony to these plaintiffs that many of the practices touted by supporters of oil development in the Arctic Refuge as examples of the oil industry's ability to "do development right" were forced on the industry as a result of successful citizen suits. Underground injection of oil field wastes serves as the best example of the changes forced by successful court action.

Successful oil and gas related litigation Trustees for Alaska has brought on behalf of public interest clients in the last two decades includes the following:

- In the fall of 1985, Trustees successfully sued EPA for failure to complete a study of drilling muds and other wastes produced during oil and gas operations, as was required by the Resource Conservation and Recovery Act. The study was supposed to be completed by October 1982. Under a consent decree, EPA agreed to complete the study by August 31, 1987.
- In February 1986, Trustees succeeded in securing a court order under NEPA requiring that the Secretary of the Interior solicit the views of the public through written comments and public hearings before making any recommendation to Congress about opening the Arctic Refuge to oil and gas development.
- In the spring of 1988, Trustees joined with the Natural Resources Defense Council in bringing a suit against ARCO over Clean Water Act violations at its North Slope drilling site reserve pits. The suit resulted in a multi-year settlement under which ARCO agreed to re-inject its drilling wastes.
  * In 1990 and 1993, Trustees successfully challenged state of Alaska oil and gas lease sales offshore of the Arctic National Wildlife Refuge.
- In 1991, Trustees sued EPA challenging an NPDES permit for a major sewage plant operated by ARCO on the North Slope. In January 1992, EPA withdrew the permit.

- In 1992, Trustees successfully sued the Department of the Interior under the Marine Mammal Protection Act, forcing it to adopt regulations governing the incidental take of walrus, polar bear and whales during oil and gas exploration activities.
  * In 1996, Trustees successfully challenged a state of Alaska oil and gas lease sale in Cook Inlet.
- In 1997, on behalf of two Alaska Native villages, Trustees won a suit against the State of Alaska involving a state oil and gas lease sale. The state violated its own coastal zone management laws when it failed to evaluate the impacts of the proposed lease sale to fish and wildlife on which the villages depend for subsistence, and to habitats that sustain these subsistence resources.

FUTURE OIL DEVELOPMENT IN AMERICA'S ARCTIC

The extent of existing oil field development in America's Arctic serves as a yardstick by which proposed development can be measured. It also serves as a "reality check" to gauge claims that development of an oil reservoir of the size that some believe exists in the Arctic Refuge can be done with minimal surface disturbance and inconsequential impacts. It is true that today drilling for oil in the Arctic is more efficient and drill pads are, for the most part, not so numerous or so large as in the early days of field development. But technological improvements—particularly in the ability to find and extract oil—are allowing the industry to access oil reserves that in the past would not have been considered profitable and to develop fields more intensively to maximize oil production. In addition, the number of oil wells and the infrastructure needed to connect them to processing facilities is more a function of the geology of the reservoir than it is the availability of efficient development technologies.

As for pollution and industrial wastes generated from oil field development, the reality is that the extraction of crude oil—a toxic substance—from the earth's crust is a dirty business. Oil development in the Arctic Refuge or other pristine areas in America's Arctic can be expected to produce the kinds and volumes of pollution, loss of habitat from construction of roads and support infrastructure, disturbances to wildlife and loss of wilderness, that have been documented to date in existing oil fields. It is not possible to extract the oil that may lie beneath the coastal plain of the Arctic Refuge and, at the same time, preserve its ecosystem functions intact. Claims to the contrary, which lead the American public to believe that they can "have their cake and eat it, too" with regard to management of this unique slice of America's Arctic, are disingenuous at best.

Given the extent of oil development that currently exists in America's Arctic, the projections for oil production from as yet untapped onshore reservoirs within the boundaries of these developed areas, and the support infrastructure already in place to tap these reservoirs, federal oil policy should focus on bringing these fields into production while at the same time ensuring more effective enforcement of environmental protection laws for all oil development in the region. And federal land policy should focus on securing permanent protection for unique wild areas like the Arctic National Wildlife Refuge.

Thank you for the opportunity to provide comments.

NOTE: FOOTNOTES BELOW BELONG TO VAN TUYN PRESENTATION

[i] State of Alaska, Department of Environmental Conservation, 1996 Water Quality Assessment Report, (August 1996), p. 6.

[ii] U.S. Army Engineer District, Alaska, Draft Environmental Impact Statement Beaufort Sea Oil and Gas Development/Northstar Project, Vol. IV, ch. 10, p. 10-2.

[iii] U.S. Department of the Interior, Northeast National Petroleum-Reserve Alaska Draft Integrated Activity Plan/Environmental Impact Statement, (December 1997), p. III-A-5.

[iv] U.S. Army Engineer District, Alaska, Draft Environmental Impact Statement Beaufort Sea Oil and Gas Development/Northstar Project, Vol. IV, ch. 10, p. 10-2.

[v] Alaska Department of Natural Resources, Proposed Oil and Gas Lease Sale 86 Central Beaufort Sea - Preliminary Finding of the Director Volume I, (January 28, 1997), p. 2-12.

[vi] A unit is a combination of existing leases that the lessees and the State of Alaska (or Minerals Management Service for federal offshore lands) agree should be combined into one unit to promote optimal development without unnecessary duplication of infrastructure.

[vii] Anchorage Daily News, "$55 million bid for oil leases," June 25, 1998, p. F-1.

[viii] Anchorage Daily News, "BP, Arco win 87% of NPR-A oil leases," May 6, 1999.

[ix] State of Alaska, Department of Natural Resources, Historical and Projected Oil and Gas Consumption, (1997), p. 19, and Table 4, p. 27.

[x] Anchorage Daily News, "New deposits found on Slope," June 18, 1998, p. F-1.

[xi] U.S. Department of Energy, Alaska Oil and Gas: Energy Wealth or Vanishing Opportunity, (1991), Table 2-5.

[xii] Christian Science Monitor, "Quest to wring more oil from Alaska North Slope," October 8, 1996, p. 4. Oil company estimates are even higher. Anchorage Daily News, "Tarn prospect becomes worthy 'satellite," January 5, 1997, p. A-5 (1 billion estimate); Alaska Oil & Gas Reporter, "Meet Alaska: BP sees more oil on the slope: BP's Richard L. Olver sees another 5 billion barrels, not counting ANWR," February 19, 1996, p. 13.

[xiii] Anchorage Daily News, "Brighter future foreseen for North Slope," January 5, 1997, p. A-1.

[xiv] Anchorage Daily News, "Advisors see Alaska's oil output rising," March 30, 1995, p. A-1; Alaska Oil & Gas Reporter, "Industry Outlook: Cambridge Energy Research says Alaska production will increase again," February 17, 1997, p. 15. BP and other industry documents, submitted as part of sworn testimony to the Alaska Oil and Gas Commission for Prudhoe Bay hearings, May 16, 1995, projected production to the year 2040. Attachments to Richard A. Fineberg's rebuttal testimony to "Summary Critique" of James E. Eason, August 28, 1995.

[xv] State of Alaska, Department of Natural Resources, Historical and Projected Oil and Gas Consumption, (May 1998), Table 1, p. 4. The state lists 46 separate oil and gas fields.

[xvi] U.S. Department of the Interior, Fish & Wildlife Service, Final Environmental Impact Statement And Preliminary Final Regulations: Proposed Oil & Gas Exploration With The Coastal Plain Of The Arctic National Wildlife Refuge, Alaska, (1983), p. II-10.

[xvii] U.S. Department of the Interior, Fish & Wildlife Service Memorandum from Botanist, Arctic National Wildlife Refuge to Refuge Manager (April 3, 1998).

[xviii] Petroleum News - Alaska, "North Slope Borough denies permit," June 22 - July 26, 1998, p. A-2.

[xix] Anchorage Daily News, "The Sound of Oil," in We Alaskans, May 17, 1998, p. F-6.

[xx] U.S. Department of the Interior, Fish and Wildlife Service Memorandum from Botanist, Arctic National Wildlife Refuge to Refuge Manager (April 3, 1998), p. 2.

[xxi] State of Alaska, Department of Natural Resources, Division of Oil and Gas, Final Finding of the Director Regarding Oil and Gas Lease Sale 75A Colville River Exempt, June 22, 1993, p. 41 (citing AOGC 1992 Report).

[xxii] U.S. Army Engineer District, Alaska, Draft Environmental Impact Statement Beaufort Sea Oil and Gas Development/Northstar Project, (June 1998),Volume IV, § 10.2.2, p. 10-2.

[xxiii] Greenpeace, Oil in Arctic Waters: The Untold Story Of Offshore Drilling In Alaska, (1993), pp. 68.

[xxiv] U.S. Army Corps of Engineers Alaska District, Final Environmental Impact Statement Prudhoe Bay Oil Field Water flood Project, Prudhoe bay Alaska, (October 1980),Vol. 1, p. 3-60.

[xxv] U.S. Department of the Interior, Bureau of Land Management, Northeast National Petroleum Reserve-Alaska Final Integrated Activity Plan/Environmental Impact Statement, (August 1998), Vol. 1, p. IV-A-11.

[xxvi] U.S. Army Engineer District, Alaska, Draft Environmental Impact Statement Beaufort Sea Oil and Gas Development/Northstar Project, (June 1998), Volume II, Table 3-2.

[xxvii] U.S. Army Engineer District, Alaska, Draft Environmental Impact Statement Beaufort Sea Oil and Gas Development/Northstar Project, (June 1998), Volume II, Table 3-3. Water volume needs for water injection or flooding with either treated seawater or treated produced waters range from two barrels of water per barrel of oil produced to 170% of total produced fluids. *Ibid*., p. 3-45.

[xxviii] U.S. Army Engineer District, Alaska, Draft Environmental Impact Statement Beaufort Sea Oil and Gas Development/Northstar Project, (June 1998),Volume II, p. 3-8.

[xxix] U.S. Department of the Interior, Bureau of Land Management, Northeast National Petroleum Reserve-Alaska Final Integrated Activity Plan/Environmental Impact Statement, (August 1998), Vol. 1, p. IV-A-11.

[xxx] U.S. Department of the Interior, Bureau of Land Management, Northeast National Petroleum Reserve-Alaska Final Integrated Activity Plan/Environmental Impact Statement (August 1998), Vol. 1, p. IV-A-11.

[xxxi] U.S. Army Engineer District, Alaska, Draft Environmental Impact Statement Beaufort Sea Oil and Gas Development/Northstar Project, (June 1998), Volume II, p. 3-22.

[xxxii] U.S. Army Engineer District, Alaska, Draft Environmental Impact Statement Beaufort Sea Oil and Gas Development/Northstar Project, (June 1998), Volume II, pp. 4-31 - 32 (map showing active permitted onshore water withdrawal sites).

[xxxiii] U.S. Army Engineer District, Alaska, Draft Environmental Impact Statement Beaufort Sea Oil and Gas Development/Northstar Project, (June 1998),Volume IV, § 10.2.2, p. 10-2.

[xxxiv] U.S. Fish and Wildlife Service, Comparison of actual and predicted impacts of the Trans-Alaska Pipeline System and Prudhoe Bay oil fields on the North Slope of Alaska, (1987) draft report prepared by Fairbanks Fish & Wildlife Enhancement Office.

[xxxv] State of Alaska, Department of Natural Resources, Final Best Interest Finding, Lease Sale 75A, June 22, 1993, p. 41. Aside from the TAPS haul road, the major oil field road is the Spine Road, which is wider than other roads, at about 46 - 66 feet. R. Meehan, Oil Development in Northern Alaska, prepared for U.S. EPA (Corvallis, Oregon, 1988), p. 34.

[xxxvi] U.S. Department of the Interior, Bureau of Land Management, Northeast National Petroleum Reserve-Alaska Final Integrated Activity Plan/Environmental Impact Statement, (August 1998), Vol. 1, p. III-C-55.

[xxxvii] See U.S. Army Engineer District, Alaska, Draft Environmental Impact Statement Beaufort Sea Oil and Gas Development/Northstar Project, (June 1998),Volume II, Table 3-2.

[xxxviii] R. Meehan, Oil Development in Northern Alaska, prepared for U.S. EPA (Corvallis, Oregon, 1988), p. 35.

[xxxix] U.S. Department of Interior, Minerals Management Service, NPR-A Symposium Proceedings: Science, Traditional Knowledge, and the Resources of the Northeast Planning Area of the National Petroleum Reserve - Alaska, April 16-18, 1997, Anchorage, Alaska, p. 1-12 (remarks of Beez Hazen, P.E., Northern Engineering & Scientific entitled "Use of Ice Roads and Ice Pads for Alaskan Arctic Oil Exploration Projects").

[xl] U.S. Department of the Interior, Bureau of Land Management, Northeast National Petroleum Reserve-Alaska Final Integrated Activity Plan/Environmental Impact Statement, (August 1998), p. II-93.

[xli] U.S. Department of the Interior Proposed Trans-Alaska Pipeline - Introduction and Summary, (1972) Volume I, pp. 55-56.

[xlii] U.S. Fish and Wildlife Service, Comparison of actual and predicted impacts of the Trans-Alaska Pipeline System and Prudhoe Bay oil fields on the North Slope of Alaska, (1987) draft report prepared by Fairbanks Fish & Wildlife Enhancement Office, Table 2, p. 12.

[xliii] U.S. Department of the Interior, Bureau of Land Management, Northeast National Petroleum Reserve-Alaska Final Integrated Activity Plan/Environmental Impact Statement, (August 1998), Vol. 1, p. III-C-57.

[xliv] Ibid.

[xlv] U.S. Department of the Interior, Bureau of Land Management, Northeast National Petroleum reserve-Alaska Final Integrated Activity Plan/Environmental Impact Statement, (August 1998), Vol. 1, pp. III-C-59 - 60.

[xlvi] U.S. Department of the Interior, Bureau of Land Management, Northeast National Petroleum Reserve-Alaska Final Integrated Activity Plan/Environmental Impact Statement, (August 1998), Vol. 1, p. III-C-57-58.

[xlvii] State of Alaska, Department of Natural Resources, Final Best Interest Finding, Lease Sale 75A, June 22, 1993, p. 41.

[xlviii] U.S. Department of the Interior, Bureau of Land Management, Northeast National Petroleum reserve-Alaska Final Integrated Activity Plan/Environmental Impact Statement, (August 1998), Vol. 1, pp. III-C-57 - 58.

[xlix] U.S. Army Engineer District, Alaska, Draft Environmental Impact Statement Beaufort Sea Oil and Gas Development/Northstar Project, (June 1998),Volume IV, § 10.2.2, p. 10-2.

[l] BP Exploration (Alaska) Inc., Fact Sheet - Produced Water, No.98-15 ("six gathering centers/flow stations in the Prudhoe Bay field separate crude oil from produced water and natural gas"); R. Meehan, Oil Development in Northern Alaska, prepared for U.S. EPA (Corvallis, Oregon, 1988), p. 32.

[li] ARCO, Supplement to Annual Report, (1985), cited by NRDC et al., Tracking Arctic Oil: Background Technical Report, (1991), p. 4.

[lii] State of Alaska, Department of Natural Resources Oil and Gas lease Sale 87 North Slope Areawide Final Finding of the Director, (march 17, 1998), Vol. I, ch. 4, p. 4-5 (four to five thousand workers). See also, BP Exploration (Alaska) Inc., Fact Sheet - Environmental Setting, No. 98-1 (2500 employees); U.S. Department of the Interior, Bureau of Land Management, Northeast National Petroleum Reserve-Alaska Final Integrated Activity Plan/Environmental Impact Statement, (August 1998), Vol. 1, p. III-C-4 (6.000 North Slope oil-industry workers in 1992); State of Alaska, North Slope Borough, Solid Waste Management Plan, (April 1996), § 10.3.1, p. 10-4 ("The number of employees at Prudhoe Bay/Kuparuk was estimated at 6,235 in 1994 from state Workmen's Compensation filings ... the estimated resident population of SA-10 is put at approximately 3,100.").

[liii] U.S. Department of the Interior, Proposed Trans-Alaska Pipeline Introduction and Summary (EIS Volume 1, (1972), p. 50. In fact, the TAPS EIS's description of the proposed major federal "action" was restricted to permitting for construction of TAPS. Ibid., p. i-a.

[liv] U.S. Department of the Interior, Proposed Trans-Alaska Pipeline Introduction and Summary (EIS Volume 4, (1972), Figure 5, p. 264.

[lv] State of Alaska, Department of Natural Resources, Proposed Oil and Gas Lease Sale 86 Central Beaufort Sea, Preliminary Finding of the Director, Volume 1, January 28, 1997, p. 2-14, Table 2.1. Dates of discovery and production startup and estimated original economically recoverable oil reserves given in the table for major fields are from *ibid*.

[lvi] State of Alaska, North Slope Borough, Solid Waste Management Plan, (April 1996), § 10.3.1, p. 10-4.

[lvii] State of Alaska, North Slope Borough, Solid Waste Management Plan, (April 1996), § 10.3.1, p. 10-5.

[lviii] State of Alaska, North Slope Borough, Oxbow Landfill - Annual Reports, (1996, 1997).

[lix] BP Exploration (Alaska) Inc., Fact Sheet - Solid & Hazardous Waste, No.98-18

[lx] State of Alaska, Department of Environmental Conservation, "Environmental information relative to air and water quality, solid waste disposal and oil spill contingencies for the Arctic National Wildlife Refuge," (1986) North Slope District Office, Fairbanks, 65 pp., source cited by Mueller, K.A., "Toxicity and water quality of natural water bodies, reserve pits and selected sites at North Slope, Alaska, Oilfields" (1986), U.S. Fish & Wildlife Service, Ecological Services, Fairbanks, NAES-TR-92-01, p.2.

[lxi] State of Alaska, Department of Environmental Conservation, Oil and Gas Waste Management Issue and Recommendations for the Arctic National Wildlife Refuge, Appendix I, (1990), p.59.

[lxii] U.S. Army Engineer District, Alaska, Draft Environmental Impact Statement Beaufort Sea Oil and Gas Development/Northstar Project, (June 1998), Volume III, Table 5.4-7.

[lxiii] EPA Office of Air Quality Planning and Standards, AIRSWeb at http://www.epa.gov:6703/airwdcd/ow Source Count Report (August 21, 1998) for State of Washington Nitrogen Dioxide Air Pollution Sources.

[lxiv] EPA AIRSWeb http://www.epa.gov:6703/airwdcd/ow (August 21, 1998) Source Ranking Report Alaska Carbon MoNOxide Air Pollution Sources (Anchorage total 38,500 tons per year).

[lxv] See Radian Corporation, Air Toxics Technical Assistance for the State of Alaska, Final Report, (March 1987) (estimated toxic emissions from oil field activities).

[lxvi] U.S. Department of Interior, Bureau of Land Management, Northeast National Petroleum Reserve-Alaska Final Integrated Activity Plan Environmental Impact Statement, (August 1998), Volume 1, p. IV-H-5.

[lxvii] U.S. Army Engineer District, Alaska, Draft Environmental Impact Statement Beaufort Sea Oil and Gas Development/Northstar Project, (June 1998), Volume IV, § 10.4, p. 10-20.

[lxviii] State of Alaska, Department of Environmental Conservation, Oil and Gas Waste Management Issues and Recommendations for the Arctic National Wildlife Refuge, (1990, Juneau), Table 3.1-1, p. 43-A.

[lxix] State of Alaska, Department of Natural Resources, Final Best Interest Finding, Lease Sale 75A, June 22, 1993, p. 42.

[lxx] State of Alaska, Department of Environmental Conservation, Oil and Gas Waste Management Issues and Recommendations for the Arctic National Wildlife Refuge, (1990, Juneau), Table 3.1-5, p. 43-D.

[lxxi] State of Alaska Department of Environmental Conservation, 1997 Oil Spill Database.

[lxxii] U.S. Department of the Interior, Bureau of Land Management, Northeast National Petroleum Reserve-Alaska Final Integrated Activity Plan/Environmental Impact Statement, (August 1998), Vol. 1, p. IV-A-34. See also, State of Alaska, Department of Environmental Conservation, 1997 Oil Spill Database.

[lxxiii] State of Alaska, Department of Environmental Conservation, Alaska Water Quality Assessment, (1990). Section 305(b) Report to EPA, p. 40. State of Alaska, Department of Environmental Conservation, Information Sheet for Reserve Pit Discharge Permit, (1985), cited by NRDC, et al., Tracking Arctic Oil: Background Technical Document, (1991), p. 12.

[lxxiv] U.S. Department of the Interior, Bureau of Land Management, Northeast National Petroleum Reserve-Alaska Draft Integrated Activity Plan/Environmental Impact Statement, (December 1997), Table IV.G-1, p. IV-G-1. The table was not reprinted in the final EIS.

[lxxv] In BP's illegal disposal at the Endicott field, Class I wastes--engine oil, paints, solvents, etc.--were mixed with Class II wastes and injected into a Class II well. The injection records for this well were then altered to hide the disposal of the illegal wastes.

[lxxvi] Anchorage Daily News, "Pollution's price tag: $1 million," May 1, 1998, p. A1; ibid., "Enviro crimes," May 6, 1998, p. B-6.

[lxxvii] Section 8002(m) of RCRA, 40 U.S.C. Section 6982(m). For more details on this exemption see NRDC, et al., Tracking Arctic Oil: Background Technical Document, (1991), p. 25.

[lxxviii] 53 Fed. Reg. 11 (Jan. 4, 1988) (report to Congress); 53 Fed. Reg. 25446 (July 6, 1988) (regulatory determination).

[lxxix] See 40 CFR § 261.4(b)(5) (1990).

[lxxx] New York Times, "The Nation's Pollution: Who Emits What, and Where," October 13, 1991, p. F10.

[lxxxi] Emergency Planning and Community Right to Know Act, Section 313, Title III, Superfund Amendments and Reauthorization Act of 1986, 42 USC § 11023.

[lxxxii] Offshore Magazine 57(5), "Activity review of US regulatory, legislative issues," May 1, 1997.

[lxxxiii] LR 19 (1997).

[lxxxiv] 42 USC § 7545(i).

[lxxxv] 42 USC § 7545(i)(4).

[lxxxvi] 61 F.R. No. 161, pp. 42812-17 (August 19, 1996).

[lxxxvii] Anchorage Daily News, "Tesoro expands presence," February 18, 1997, p. A-1.

[lxxxviii] Informal Attorney General Opinion, File No. 993-94-0102 (October 11, 1996), p.5 and n. 8.

[lxxxix] Two page letter from the Alaska Chapter of the International Association of Drilling Contractors to ADEC's Commissioner, May 1, 1998.

[xc] An ADNR Division of Oil and Gas official suggested that an example of a "significant new" piece of information would be the discovery of a new, threatened species of wildlife. Personal conversation with ADNR's Ken Boyd and Trustees for Alaska staff attorney.

[xci] State of Alaska, Office of the Governor, News Release 98-105, (May 4, 1998), "Knowles Vetoes Bill That Weakens Air Quality."

[xcii] Section 3 of House CS for CSSB No. 231 (FIN) am H (brf sup maj pfld S) (May 10, 1998)